REMARKS

Claims 1-32 are all the claims presently pending in this application. Claims 1, 4, 7, 10, 13, 16, 19, 22, 29 and 31 have been amended to more particularly define the claimed invention.

It is noted that the amendments are made only to more particularly define the invention and **not** for distinguishing the invention over the prior art, for narrowing the scope of the claims, or for any reason related to a statutory requirement for patentability. It is further noted that, notwithstanding any claim amendments made herein, Applicant's intent is to encompass equivalents of all claim elements, even if amended herein or later during prosecution.

Claims 1, 7, 10, 19, 29 and 31 are objected to due to informalities. Applicant has amended the claims in a manner believed fully responsive to all points raised by the Examiner.

Claims 25-26 and 31-32 stand rejected under 35 U.S.C. §102(b) as being anticipated by Sugawara, et al., U.S. Pat. App. Pub. No. 2002/0044315.

Claims 1-7, 9-19 and 21-24 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Hiroyuki, JP 10-336120, further in view of Fee, U.S. Pat. No. 5,777,761.

Claim 8 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Hiroyuki, JP 10-336120 and Fee, U.S. Pat. No. 5,777,761, further in view of Tammela et al., U.S. Pat. No. 6,868,234.

Claims 27-28 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Bortolini (U.S. Pat. No. 6,813,408), in view of Sugawara, et al. (U.S. Pat. App. Pub. No. 2002/0044315).

Claims 29-30 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Sugawara, et al. (U.S. Pat. App. Pub. No. 2002/0044315) in view of Yamashita, et al. (U.S. Pat. No. 5,675,676).

These rejections are respectfully traversed in view of the following discussion.

I. APPLICANT'S CLAIMED INVENTION

The claimed invention, as defined, for example, by independent claim 1, (and similarly independent claims 4, 7, 10, 13, 16, 19 and 22) is directed to a communication node including an optical signal transceiver having at least one optical signal transmitting device and at least one optical signal receiving device to transmit and receive an optical signal to and from an opposite communication node, at least one optical signal transmitting communication line to transmit an optical signal to the opposite communication node, at least one optical signal receiving communication line to receive an optical signal from the opposite communication node, and a switching device including at least two bi-directional ports, the switching device being connected to the optical signal transmitting device and to the optical signal receiving device to transmit.

When no failure has occurred in the optical signal transmitting communication line and in the optical signal receiving communication line, an optical signal fed from the optical signal transmitting device to the optical signal transmitting communication line and to transmit an optical signal fed from the optical signal receiving communication line to the optical signal receiving device.

When a failure has occurred in the optical signal transmitting communication line, the switching device switches so that the optical signal fed from the optical signal transmitting

device is transmitted via one of the at least two bi-directional ports to the optical signal receiving communication line.

When a failure has occurred in the optical signal receiving communication line, the switching device switches so that the optical signal to be fed to the optical signal receiving device is received via an other of the at least two bi-directional ports from the optical signal transmitting communication line.

The claimed invention, as defined, for example, by independent claim 25, (and similarly independent claims 27, 29 and 31) is directed to a switching device that transmits a plurality of external optical signals through a plurality of optical signal communication lines, including a plurality of optical multiplexing and demultiplexing devices each corresponding to one of the plurality of optical signal communication lines and each device including an input and output port, wherein optical signals of different types are communicated between the input and output ports of different devices of the plurality of optical multiplexing and demultiplexing devices through one of the plurality of optical signal communication lines that corresponds to specific optical multiplexing and demultiplexing devices, and a plurality of optical switches that correspond to and communicates one of the plurality of external optical signals between the plurality of optical signal communication lines and an input and output port of one of the specific optical multiplexing and demultiplexing devices, wherein when no failure has occurred in one of the plurality of optical signal communication lines.

When a failure has occurred in one of the plurality of optical signal communication lines, the one of the plurality of external optical signals is communicated to an input and output port of an other of the specific optical multiplexing and demultiplexing devices, and wherein bidirectional communication are conducted through the input and output ports.

Conventionally, installation of a communication line for standby use and coupled with an optical signal transceiver and optical signal receiver used to transmit an optical signal through the communication line for standby requires redundant equipment at an additional cost. (Application at page 21, lines 2-9).

The claimed invention (e.g., as recited in claims 1, 4, 7, 10, 13, 16, 19 and 22), on the other hand, includes "*a switching device including at least two bi-directional ports*," and "*switching device switches so that said optical signal fed from said optical signal transmitting device is transmitted via one of said at least two bi-directional ports to said optical signal receiving communication line*," and "*switching device switches so that said optical signal to be fed to said optical signal receiving device is received via an other of said at least two bi-directional ports from said optical signal transmitting communication line.*" Additionally, the claimed invention (e.g., as recited in claims 25, 27, 29 and 31), on the other hand, includes "*wherein bidirectional communication are conducted through the input and output ports.*"

These features of the claimed invention are important so that if a failure occurs in optical fiber transmission line, the switching device switches that optical signal for transmission through another optical fiber in which no failure has occurred and, therefore, installation of a communication line for standby use and of an optical signal transceiver and optical signal receiver to be used to transmit an optical signal through the communication line for standby use is not required. These features of the claimed invention also achieve a satisfactory signal protection function that leads to high reliability in the optical network system and enables a dual-ring-type optical network system to be constructed at low cost. (Application at page 20, line 27 to page 21, line 9.)

II. THE ALLEGED PRIOR ART REJECTIONS

A. The 35 U.S.C. § 102(b) Rejection over Sugawara, et al., U.S. Pat. App. Pub. No. 2002/0044315

The Examiner alleges that Sugawara, et al., U.S. Pat. App. Pub. No. 2002/0044315, (Sugawara), teaches the invention of claims 25-26 and 31-32.

With respect to independent claims 25 and 31, Applicant submits, however, that Sugawara does not teach or suggest, "*wherein bidirectional communications are conducted through the input and output ports*."

The Examiner states in paragraph 11, page 31, of the Non-Final Office Action that, "communications are conducted bilaterally, as shown by the arrows of figure 1."

However, with respect to Fig. 1, Sugawara states in paragraph [0066] that the network comprises service lines 1001, 1002, 1003 and 1004, and protection lines 1005, 1006, 1007 and 1008. Fig. 1 also shows that each of these above-mentioned lines communicates in a single direction either to a de-multiplexer (1010, 1013, or 1017), or from a multiplexer (1011, 1012, 1015, or 1016).

> [0066] Referring to FIG. 1, an optical transmission apparatus used in a wavelength-division multiplexing ring network using OADM (Optical Add Drop Multiplexer) techniques will be explained. FIG. 1 is a functional block diagram showing the configuration of an optical transmission apparatus applied to a network with the so-called FFRN (Four Fiber Ring Network) configuration. The network of FIG. 1 comprises service lines 1001 to 1004 and protection lines 1005 to 1008. The concept of this type of apparatus has been described in, for example, the references below: (Emphasis added.)

Additionally, Sugawara discloses in paragraph [0094] that the optical fiber transmission line FL, encompassing all of the embodiments of Sugawara's information transmission system, each include service lines SL and protection lines PL, wherein the

service lines and the protection lines each include a pair of optical fibers that transmit traffic bi-directionally.

> [0094] FIG. 4 shows an example of an information transmission system to which the present invention is applied. The system of FIG. 4 includes a plurality of optical transmission apparatuses (hereinafter, referred to as nodes) 1 to 4 and an optical fiber transmission line FL that connects the individual nodes in a ring. The optical fiber transmission line FL includes service lines SL and protection lines PL. Each of the lines SL, PL includes a pair of optical fibers that transmit traffic bidirectionally. The system form shown in FIG. 4 is called the so-called four-fiber ring. (Emphasis added.)

Therefore, Sugawara discloses fiber optic pairs that enable bi-directional communication between nodes based on opposite but unidirectional communication in each respective fiber optic cable.

Additionally, Sugawara fails to disclose or suggest that if a failure occurs in one piece of optical fiber transmission line, bi-directional communications can be achieved through another piece of the optical fiber transmission line.

Therefore, Applicant respectfully requests the Examiner to reconsider and withdraw this rejection since the alleged prior art reference to Sugawara fails to teach or suggest each element and feature of Applicant's claimed invention.

B. The 35 U.S.C. § 103(a) Rejection over Hiroyuki, JP 10-336120 further in view of Fee, U.S. Pat. No. 5,777,761

The Examiner alleges that Hiroyuki, JP 10-336120, (Hiroyuki), further in view of Fee, U.S. Pat. No. 5,777,761, (Fee), makes obvious the invention of claims 1-7, 9-19 and 21-24.

However, Applicant submits, however, that neither Hiroyuki, nor Fee, nor any alleged combination thereof, teaches or suggests:

"*a switching device including at least two bi-directional ports*";

"...*switching device switches so that said optical signal fed from said optical signal transmitting device is transmitted* <u>*via one of said at least two bi-directional ports*</u> *to said optical signal receiving communication line*"; and

"...*switching device switches so that said optical signal to be fed to said optical signal receiving device is received* <u>*via an other of said at least two bi-directional ports*</u> *from said optical signal transmitting communication line*," of independent claim 1, and similarly independent claims 4, 7, 10, 13, 16, 19 and 22.

Hiroyuki discloses a first data insertion bidirectional line 11 which consists of two optical fibers connected between each optical transmission device, and a second similarly configured protection bidirectional line 12 consisting of two optical fibers. Paragraph [0016-0018].

First, Hiroyuki fails to expressly teach or suggest either switch Va or Vb <u>*including at least two bi-directional ports*</u>.

Second, since Hiroyuki discloses two fiber optic pairs 11 and 12, wherein each fiber optic pair has two oppositely transmitting unidirectional communication lines, Hiroyuki teaches away from Applicant's claimed invention of a switch including at least two bi-directional ports. Based on the disclosure of Hiroyuki, switch Va or Vb include a unidirectional port for receiving the unidirectional communication traffic of each oppositely communicating fiber optic line in fiber optic pairs 11 and 12.

Fee discloses a photonic to facilitate and line protection switching in an optical network to permit fault tolerant operation having a working facility 136 for receiving and transmitting optical signals through space division switches 108a,b.

However, Fee fails to teach or suggest a switch <u>*including at least two bi-directional*</u>

ports wherein the *switching device switches so that said optical signal fed from said optical signal transmitting device is transmitted via one of said at least two bi-directional ports to said optical signal receiving communication line*, and the *switching device switches so that said optical signal to be fed to said optical signal receiving device is received via an other of said at least two bi-directional ports from said optical signal transmitting communication line.*

This feature of Applicant's invention is important for eliminating the need to install a communication line for standby use and a separate optical signal transceiver and optical signal receiver used to transmit an optical signal through a communication line for standby use. Therefore, Fee fails to overcome the deficiencies of Hiroyuki.

Therefore, Applicant respectfully requests the Examiner to reconsider and withdraw this rejection since the alleged prior art references to Hiroyuki and Fee (either alone or in combination) fail to teach or suggest each element and feature of Applicant's claimed invention.

C. The 35 U.S.C. § 103(a) Rejection over Hiroyuki, JP 10-336120 and Fee, U.S. Pat. No. 5,777,761 further in view of Tammela et al., U.S. Pat. No. 6,868,234

The Examiner alleges that Hiroyuki, JP 10-336120 and Fee, U.S. Pat. No. 5,777,761, (Hiroyuki and Fee), further in view of Tammela et al., U.S. Pat. No. 6,868,234, (Tammela), makes obvious the invention of claim 8.

The Examiner alleges that one of ordinary skill in the art would have been motivated to modify Hiroyuki and Fee with the teaching from Tammela to form the invention of claim 8. Applicant submits, however that these references would not have been combined and even

if combined, the combination would not teach or suggest each element of the claimed invention.

That is, Tammela fails to make up for the deficiencies of Hiroyuki and Fee as discussed above in section **B**.

The Examiner asserts Tammela discloses a transmission ring network wherein each node receives and transmits a different wavelength compared to all other nodes in the network.

However, even assuming *arguendo* that the Examiner's position has some merit, Tammela fails to teach or suggest, "a switch *including at least two bi-directional ports*," wherein the *switching device switches so that said optical signal fed from said optical signal transmitting device is transmitted via one of said at least two bi-directional ports to said optical signal receiving communication line*," and the "*switching device switches so that said optical signal to be fed to said optical signal receiving device is received via an other of said at least two bi-directional ports from said optical signal transmitting communication line.*" Therefore, Tammela fails to overcome the deficiencies of Hiroyuki and Fee.

Therefore, Applicant respectfully requests the Examiner to reconsider and withdraw this rejection since the alleged prior art references to Hiroyuki and Fee and Tammela (either alone or in combination) fail to teach or suggest each element and feature of Applicant's claimed invention.

D. The 35 U.S.C. § 103(a) Rejection over Bortolini, U.S. Pat. No. 6,813,408, in view of Sugawara, et al., U.S. Pat. App. Pub. No. 2002/0044315.

The Examiner alleges that Bortolini, U.S. Pat. No. 6,813,408, (Bortolini), further in

view of Sugawara, et al., U.S. Pat. App. Pub. No. 2002/0044315, (Sugawara), makes obvious the invention of claims 27-28.

The Examiner alleges that one of ordinary skill in the art would have been motivated to modify Bortolini with the teaching from Sugawara to form the invention of claims 27-28. Applicant submits, however that these references would not have been combined and even if combined, the combination would not teach or suggest each element of the claimed invention.

With respect to Applicant's independent claim 27, Applicant submits, however, that neither Bortolini, nor Sugawara, nor any alleged combination thereof, teaches or suggests, "*wherein bidirectional communications are conducted through the input and output ports*."

The Examiner admits that Bortolini fails to teach or suggest, "*wherein bidirectional communications are conducted through the input and output ports*," and alleges that Sugawara discloses this element of Applicant's claimed invention.

The Examiner bases the instant rejection based on the statement made in paragraph 11, page 31, of the Non-Final Office Action alleging Sugawara discloses, "communications are conducted bilaterally, as shown by the arrows of figure 1."

However, as argued above in section **A.**, with respect to Fig. 1, Sugawara states in paragraph [0066] that the network comprises service lines 1001, 1002, 1003 and 1004, and protection lines 1005, 1006, 1007 and 1008. Fig. 1 also shows that each of these above-mentioned lines communicates in a single direction either to a de-multiplexer (1010, 1013, or 1017), or from a multiplexer (1011, 1012, 1015, or 1016).

> [0066] Referring to FIG. 1, an optical transmission apparatus used in a wavelength-division multiplexing ring network using OADM (Optical Add Drop Multiplexer) techniques will be explained. FIG. 1 is a functional block diagram showing the configuration of an optical transmission apparatus applied to a network with the so-called FFRN (Four Fiber Ring Network) configuration. The network of FIG. 1 comprises service lines 1001 to 1004 and

> protection lines 1005 to 1008. The concept of this type of apparatus has been described in, for example, the references below: (Emphasis added.)

Additionally, Sugawara discloses in paragraph [0094] that the optical fiber transmission line FL, encompassing all of the embodiments of Sugawara's information transmission system, each include service lines SL and protection lines PL, wherein the service lines and the protection lines each include a pair of optical fibers that transmit traffic bi-directionally.

> [0094] FIG. 4 shows an example of an information transmission system to which the present invention is applied. The system of FIG. 4 includes a plurality of optical transmission apparatuses (hereinafter, referred to as nodes) 1 to 4 and an optical fiber transmission line FL that connects the individual nodes in a ring. The optical fiber transmission line FL includes service lines SL and protection lines PL. Each of the lines SL, PL includes a pair of optical fibers that transmit traffic bidirectionally. The system form shown in FIG. 4 is called the so-called four-fiber ring. (Emphasis added.)

Therefore, Sugawara discloses fiber optic pairs that enable bi-directional communication between nodes based on opposite but unidirectional communication in each respective fiber optic cable.

Therefore, Sugawara fails to overcome the deficiencies of Bortolini.

Therefore, Applicant respectfully requests the Examiner to reconsider and withdraw this rejection since the alleged prior art references to Bortolini and Sugawara (either alone or in combination) fail to teach or suggest each element and feature of Applicant's claimed invention.

E. The 35 U.S.C. § 103(a) Rejection over Sugawara, et al. (U.S. Pat. App. Pub. No. 2002/0044315) in view of Yamashita, et al. (U.S. Pat. No. 5,675,676)

The Examiner alleges that Sugawara, et al., U.S. Pat. App. Pub. No. 2002/0044315,

(Sugawara), in view of Yamashita, et al., U.S. Pat. No. 5,675,676, (Yamashita), makes obvious the invention of claims 29-30.

The Examiner alleges that one of ordinary skill in the art would have been motivated to modify Sugawara with the teaching from Yamashita to form the invention of claims 29-30. Applicant submits, however that these references would not have been combined and even if combined, the combination would not teach or suggest each element of the claimed invention.

With respect to Applicant's independent claim 29, Applicant submits, however, that neither Sugawara, nor Yamashita, nor any alleged combination thereof, teaches or suggests, "*wherein bidirectional communications are conducted through the input and output ports*."

The Examiner bases the instant rejection based on the statement made in paragraph 11, page 31, of the Non-Final Office Action alleging Sugawara discloses, "communications are conducted bilaterally, as shown by the arrows of figure 1."

However, as argued above in section **A.**, with respect to Fig. 1, Sugawara states in paragraph [0066] that the network comprises service lines 1001, 1002, 1003 and 1004, and protection lines 1005, 1006, 1007 and 1008. Fig. 1 also shows that each of these above-mentioned lines communicates in a single direction either to a de-multiplexer (1010, 1013, or 1017), or from a multiplexer (1011, 1012, 1015, or 1016).

> [0066] Referring to FIG. 1, an optical transmission apparatus used in a wavelength-division multiplexing ring network using OADM (Optical Add Drop Multiplexer) techniques will be explained. FIG. 1 is a functional block diagram showing the configuration of an optical transmission apparatus applied to a network with the so-called FFRN (Four Fiber Ring Network) configuration. The network of FIG. 1 comprises service lines 1001 to 1004 and protection lines 1005 to 1008. The concept of this type of apparatus has been described in, for example, the references below: (Emphasis added.)

Additionally, Sugawara discloses in paragraph [0094] that the optical fiber transmission line FL, encompassing all of the embodiments of Sugawara's information

transmission system, each include service lines SL and protection lines PL, wherein the service lines and the protection lines each include a pair of optical fibers that transmit traffic bi-directionally.

> [0094] FIG. 4 shows an example of an information transmission system to which the present invention is applied. The system of FIG. 4 includes a plurality of optical transmission apparatuses (hereinafter, referred to as nodes) 1 to 4 and an optical fiber transmission line FL that connects the individual nodes in a ring. The optical fiber transmission line FL includes service lines SL and protection lines PL. Each of the lines SL, PL includes a pair of optical fibers that transmit traffic bidirectionally. The system form shown in FIG. 4 is called the so-called four-fiber ring. (Emphasis added.)

Therefore, Sugawara discloses fiber optic pairs that enable bi-directional communication between nodes based on opposite but unidirectional communication in each respective fiber optic cable.

Yamashita discloses an optical branching apparatus in which a pair of optical transmission lines as reverse and forward links are branched into a plurality of lines including a plurality of wavelengths and demultiplexing ports and a plurality of optical transmission media. (Abstract.)

However, Yamashita fails to teach or suggest demultiplexing/multiplexing units conducting bidirectional communication including "*wherein bidirectional communications are conducted through the input and output ports*." This feature of Applicant's invention is important to enable the elimination of an additional communication line and of an optical signal transceiver and optical signal receiver to be used to transmit an optical signal through the communication line for standby use.

Therefore, Yamashita fails to overcome the deficiencies of Sugawara.

Therefore, Applicant respectfully requests the Examiner to reconsider and withdraw this rejection since the alleged prior art references to Sugawara and Yamashita (either alone

or in combination) fail to teach or suggest each element and feature of Applicant's claimed invention.

III. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicant submits that claims 1-32, all of the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

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